Therapeutic Efficacy of Short Chain Fatty Acids Against Pancreatic Cancer

Rafael I Guzman Arevalo, Sina Aslanbadi, Conner Hartupee, Joycelynn Coleman-Barnett, Dr. Omeed Moaven

LSUHSC, Department of Surgical Oncology

Introduction

- Pancreatic ductal adenocarcinoma (PDAC) is projected to become the second leading cause of cancer-related deaths in the United States. Current treatments are less effective, and resistance rates are high.
- Short chain fatty acids (SCFA) have been demonstrated to exert anti-tumor activity in previous studies.
- Butyrate has been found to have anti-proliferative and pro-apoptotic effects on PDAC cell lines, but few studies have investigated the effects of other SCFA or a combination of them on PDAC cell lines in addition to chemotherapy.
- Our study sought to investigate the effects of a combination of acetate, butyrate and propionate on PDAC cell lines, and whether the combination of the SCFA treatment with chemotherapy produced a synergistic effect.

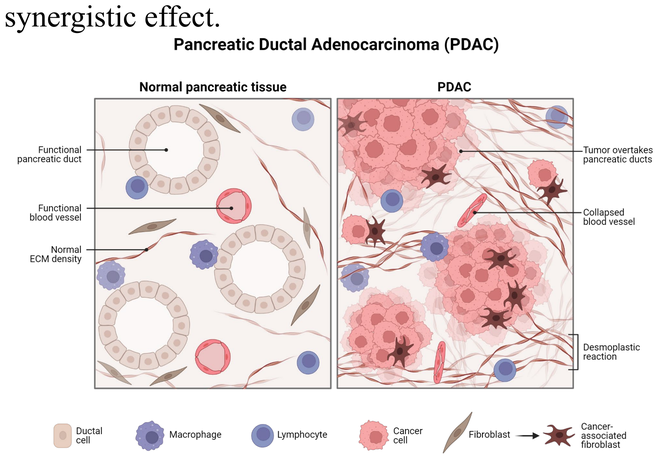
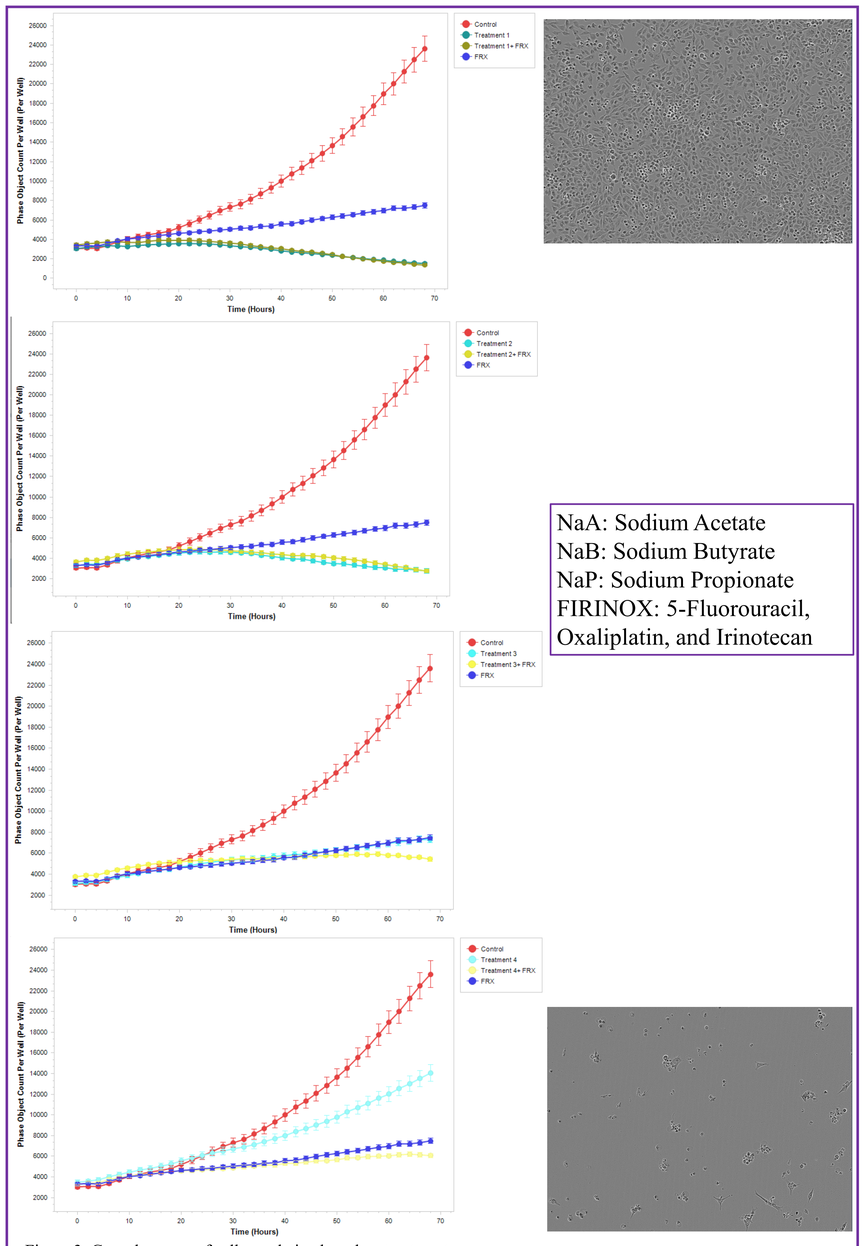


Figure 1: Graphical description of tumor microenvironment

Proliferation Assay



NaA: Sodium Acetate
NaB: Sodium Butyrate
NaP: Sodium Propionate
FIRINOX: 5-Fluorouracil, Oxaliplatin, and Irinotecan

Figure 3: Growth curves of cell population based on treatment group

Results

- Preliminary results demonstrated a dose-dependent cytotoxic effect of the SCFA against the tumor cells.
- The dose-dependent antiproliferative effect was observed in the SCFA combination only treatment ($p = <0.01$) and in the SCFA with FIRINOX chemotherapy treatment groups ($p = <0.01$).
- SCFA plus chemotherapy treatment did decrease cell growth, however, there was no synergistic effect produced.

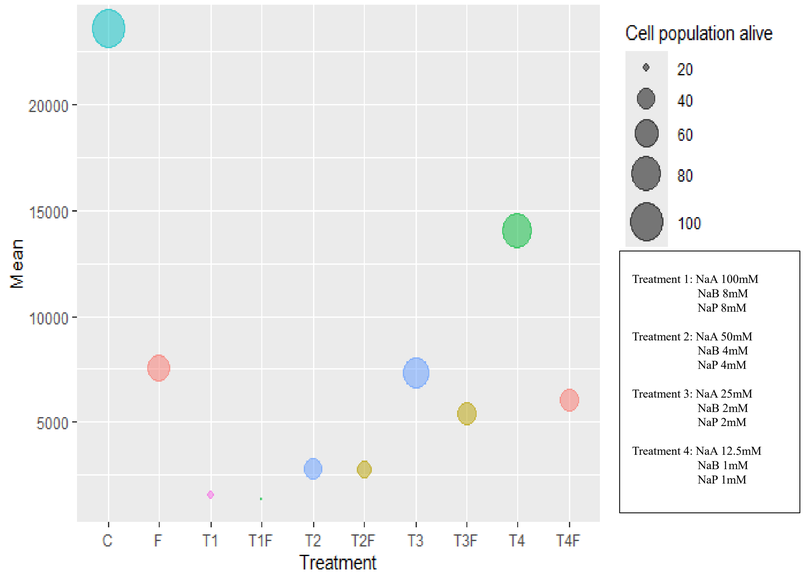


Figure 5: Effect of SCFA and chemotherapy treatment on cell number and viability

Methods

Proliferation and Cell Viability Assays

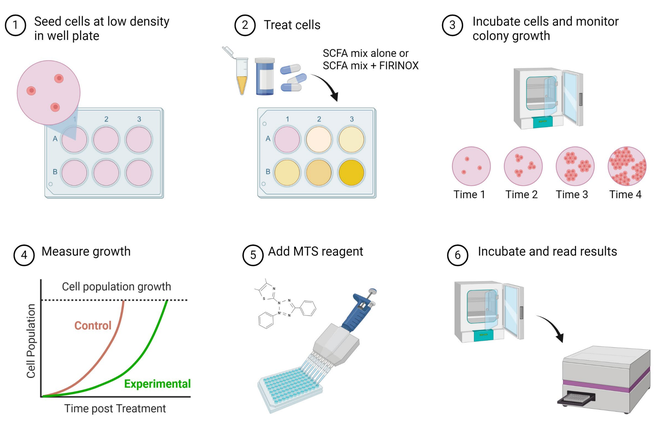
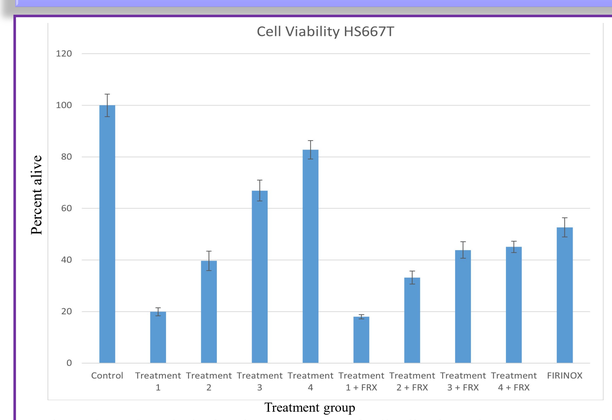


Figure 2: Methods used for cell growth and viability analysis

HS667T MTS



Treatment 1: NaA 100mM NaB 8mM NaP 8mM

Treatment 2: NaA 50mM NaB 4mM NaP 4mM

Treatment 3: NaA 25mM NaB 2mM NaP 2mM

Treatment 4: NaA 12.5mM NaB 1mM NaP 1mM

Figure 4: MTS analysis showing percentage of cells alive in each treatment group

Conclusion

- The SFA combination exerted a dose-dependent, anti-proliferative effect on the PDAC cell lines, and a similar effect was observed with the combination of SFA and chemotherapy.
- The same dose-dependent response was observed in the cell viability assays, with a decrease in viability when treated with SFA combination or SFA in addition to chemotherapy.
- Additional studies should be conducted to explore the mechanism responsible for the antiproliferative effects seen.